

NASA CR-

141500

TECHNICAL NOTE

EVALUATION OF AGFACONTOUR PROFESSIONAL FILM

Prepared Under

Task Order HT-42
(Contract NAS 9-11500)(NASA-CR-141500) EVALUATION OF AGFACONTOUR
PROFESSIONAL FILM (Technicolor Graphic
Services, Inc.) 12 p HC \$3.25 CSCL 14B

N75-15935

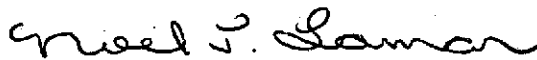
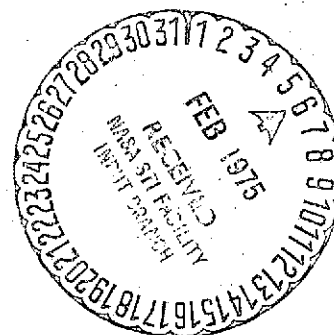
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SUMMARY

The purpose of this report is to present the results obtained by the Photo Science Office in the evaluation of Agfacontour Professional Film. The feasibility of utilizing this film in the evaluation of aerial or extraterrestrial imagery has been investigated. Sensitometric properties have been determined, and optimum handling techniques have been identified in an attempt to facilitate better use of the material.

PROCEDURES

Agfa-Gevaert produces a film which can isolate all the areas of a black and white photograph having essentially equal densities. This film is called Agfacontour Professional Sheet Film.

Tests were made to acquire proficiency in the use of this film, and to establish sensitometric parameters for the film.

The test film was hand-processed using Agfacontour developer at 70°F. for 2.0 minutes, a three-percent acetic acid short stop for 30 seconds, and quick fix for 2.0 minutes. As was stated in the Agfa literature, it is absolutely necessary to use the short stop to prevent a bad yellow-orange stain from resulting.

The material, upon processing, yields a low density at an intermediate exposure level, and D_{max} at both higher and lower exposure levels. These low density regions correspond to areas of approximately equal density in the original. By varying the light intensity or exposure time, different densities may be isolated. The range of density isolated, or the "width of the slice", can be controlled through the use of filters over the light source.

Figure 1 is a family of sensitometric curves made with a range of yellow filters showing the narrowing of the "density slice" with increased strength of the yellow filter. Figure 2 is a similar family of curves with magenta filters showing the widening of the "slice" with increased magenta filtration.

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FILM _____ EMULSION # AGFA Contour _____ MFG _____ EXPIRATION DATE _____

CHEMICAL
ANALYSIS

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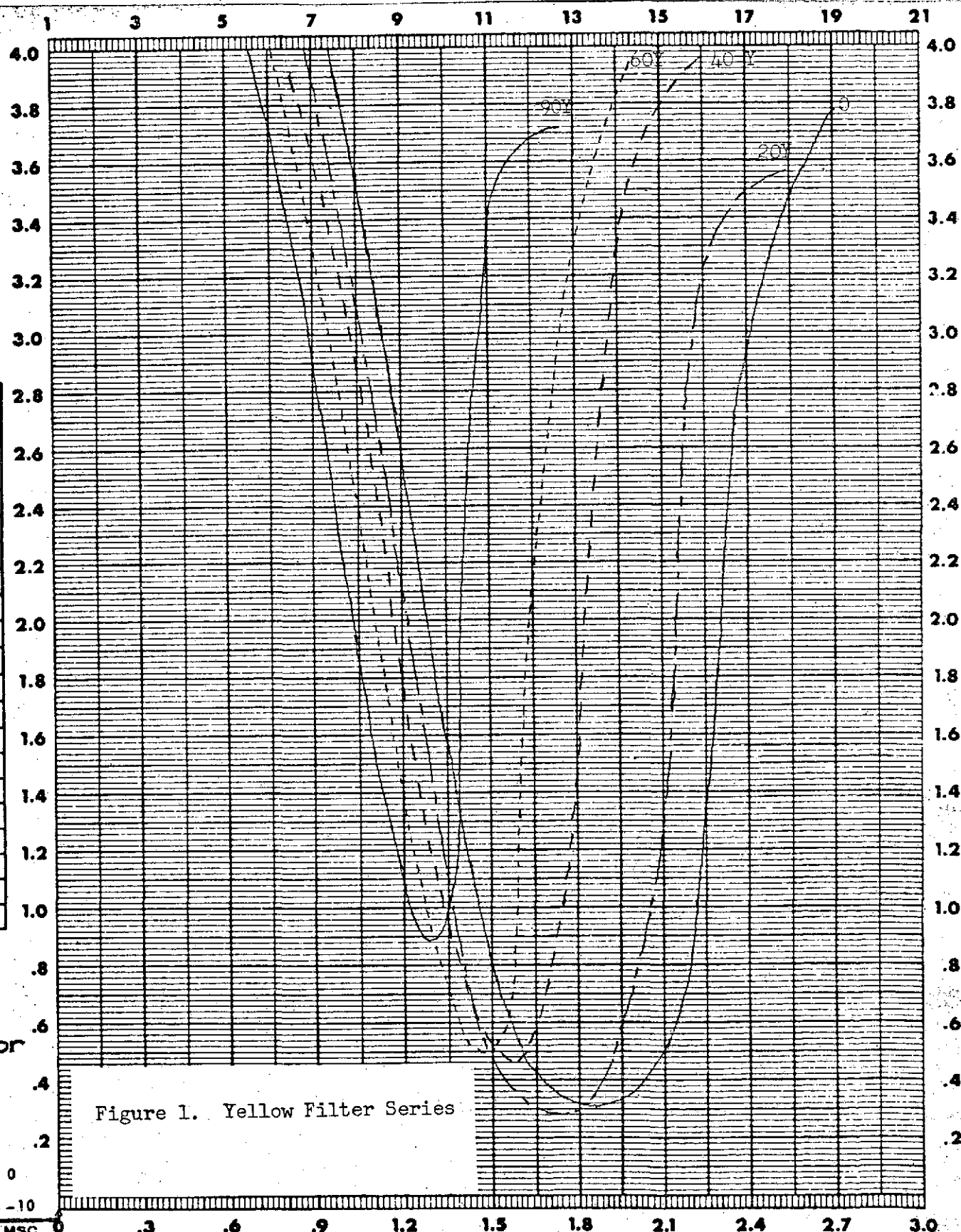
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CHEMICAL
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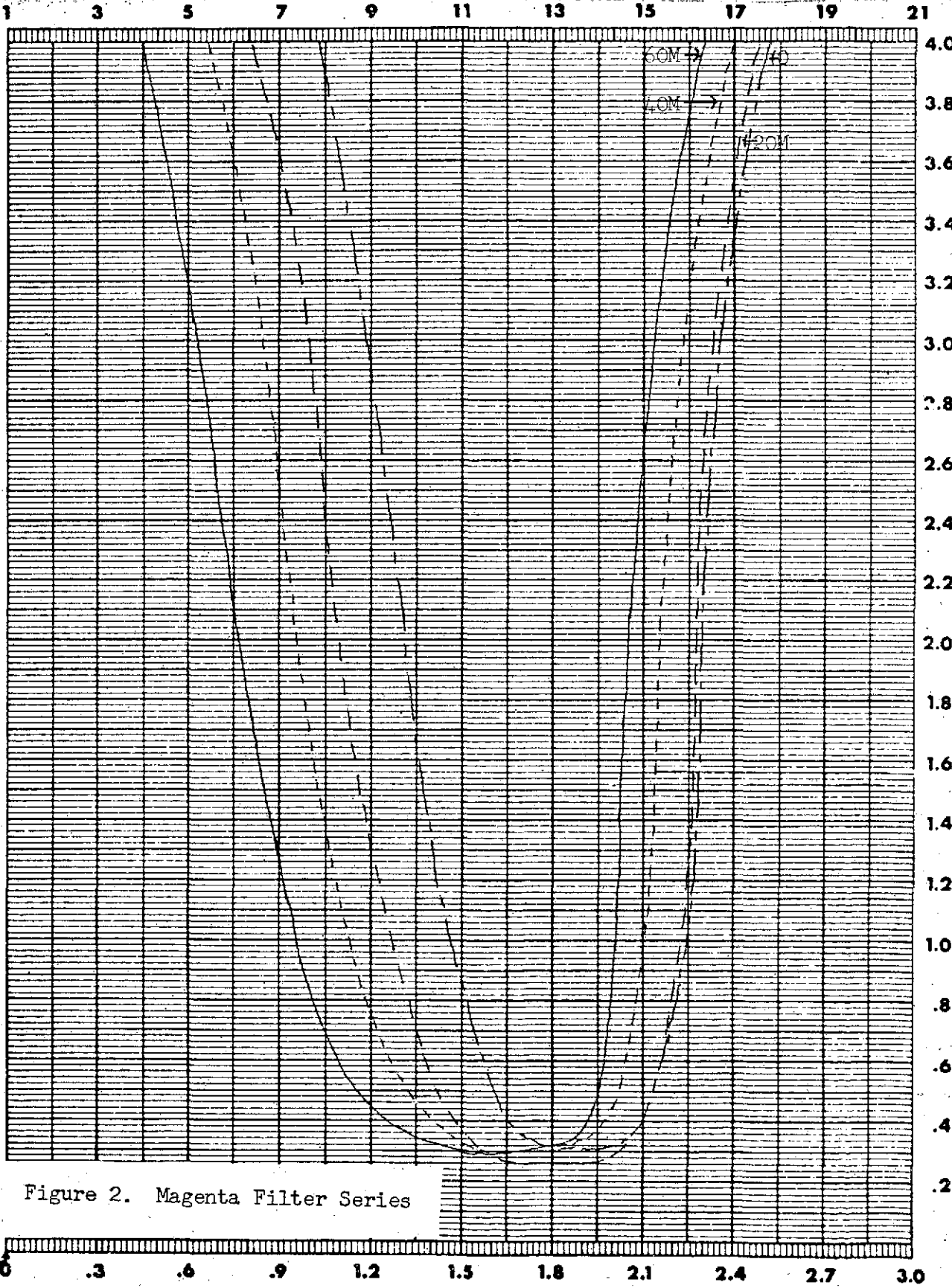


Figure 2. Magenta Filter Series

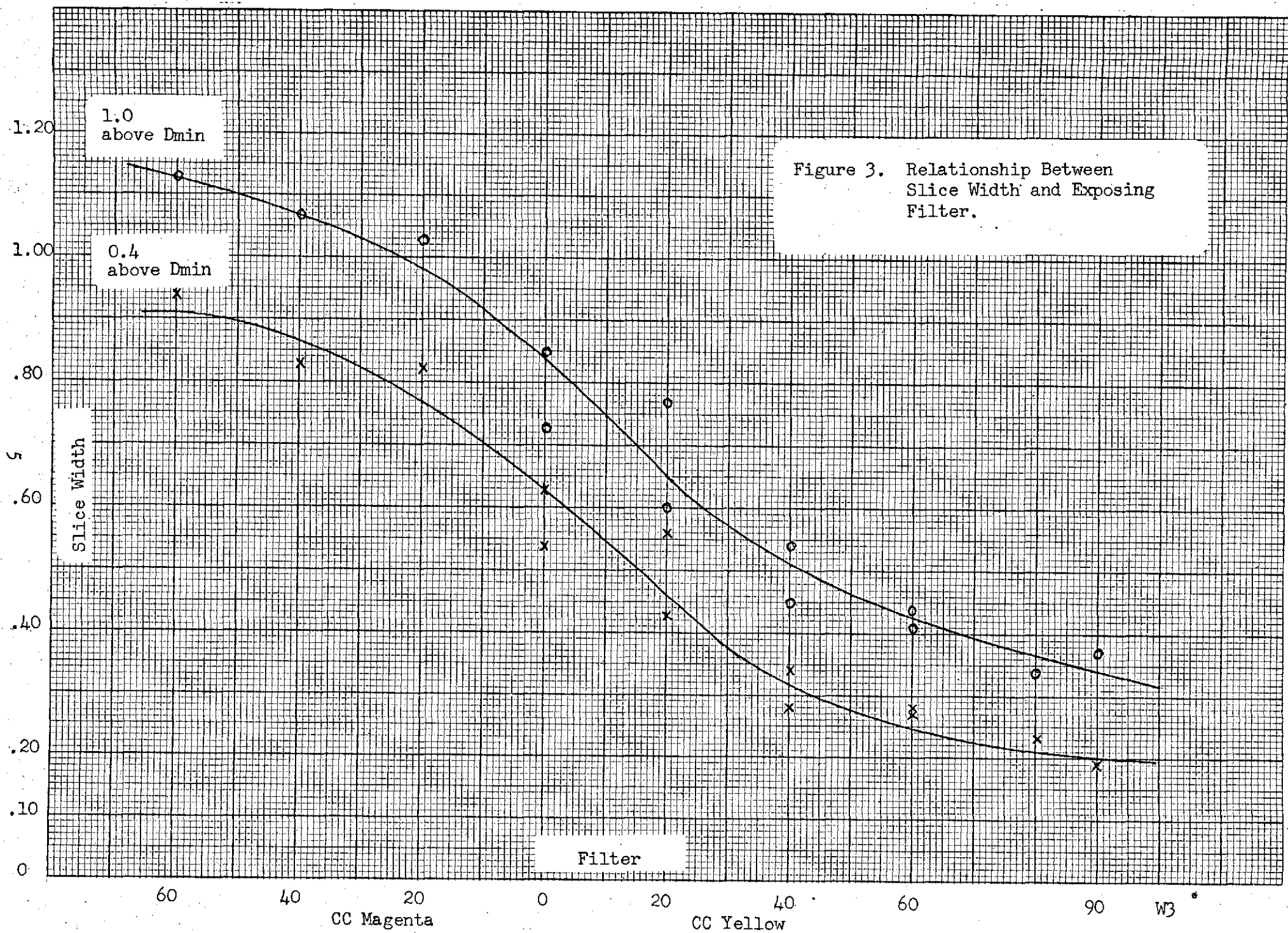
Figure 3 is a plot of the filter strength and color against the slice width (at two density levels above the minimum density) in log exposure units.

Figure 4 is a family of sensitometric curves at different development times. As the developing time is varied, there is no systematic variation in the density level in the original at which the density slice occurs. Also, there is no systematic variation in width of the slice. The only systematic variation with developing time is the magnitude of the minimum density. Figure 5 is a plot of the density minimum against developing time.

The exposure necessary to isolate a given density in a sample is not exactly a reciprocal relationship with the transmission of the sample. Figure 6 is a plot of exposure against the density which is isolated. The dashed line represents the direct reciprocal relation. Tests indicate that this difference is not due to reciprocity failure. If the image is projected onto the contour film instead of contact printed, the difference is larger, as indicated by the dotted line. This variation is a function of the specular and diffuse densities of the negative.

The exposure required to reach minimum density with CC50Y filter, normal development, and a tungsten light source, is 3.75 foot candles/second.

The range of densities that the contour film isolates is rather broad, but may be narrowed by either of two methods. The contour film image may be recopied onto Agfacontour film. This



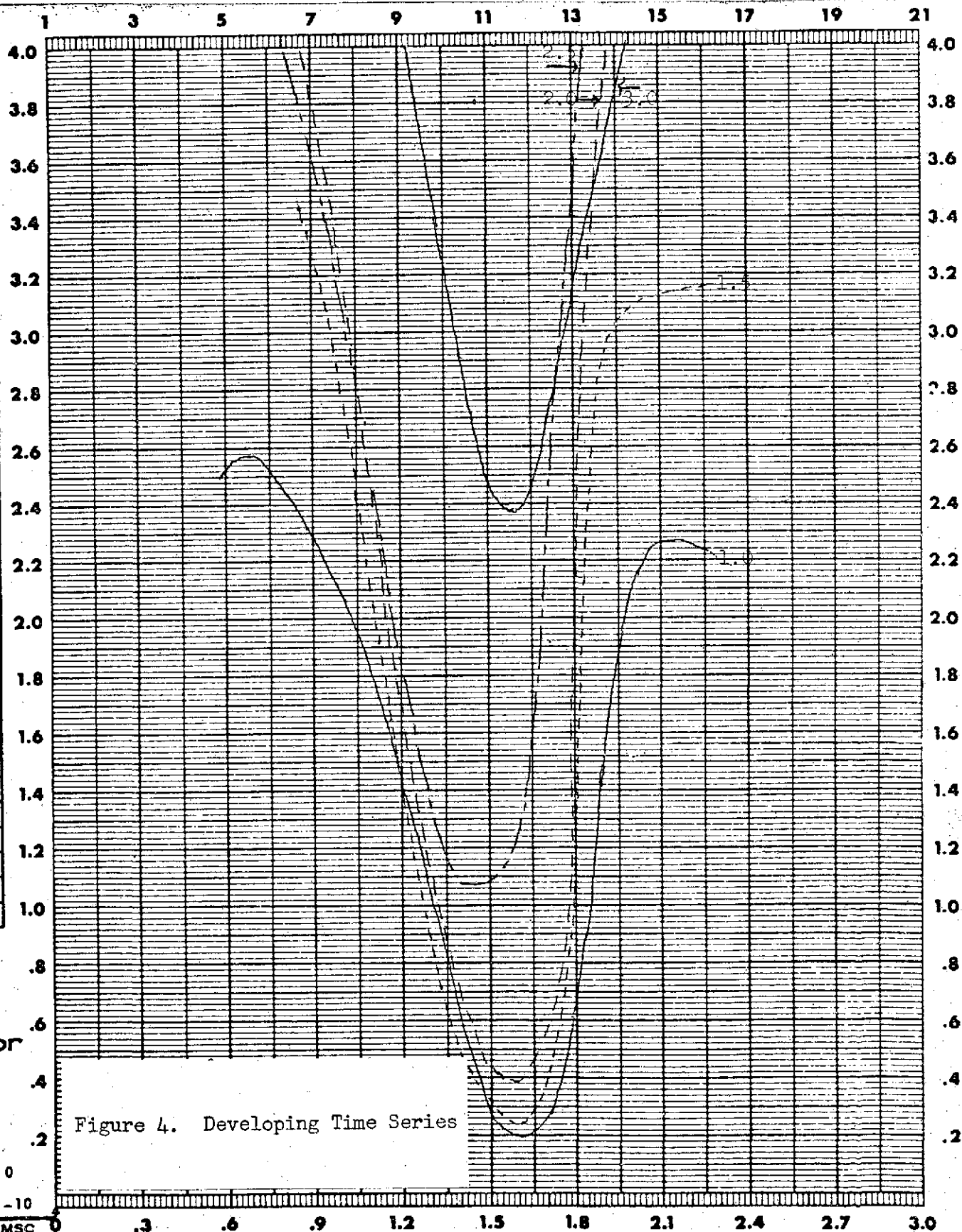
CHEMICAL ANALYSIS

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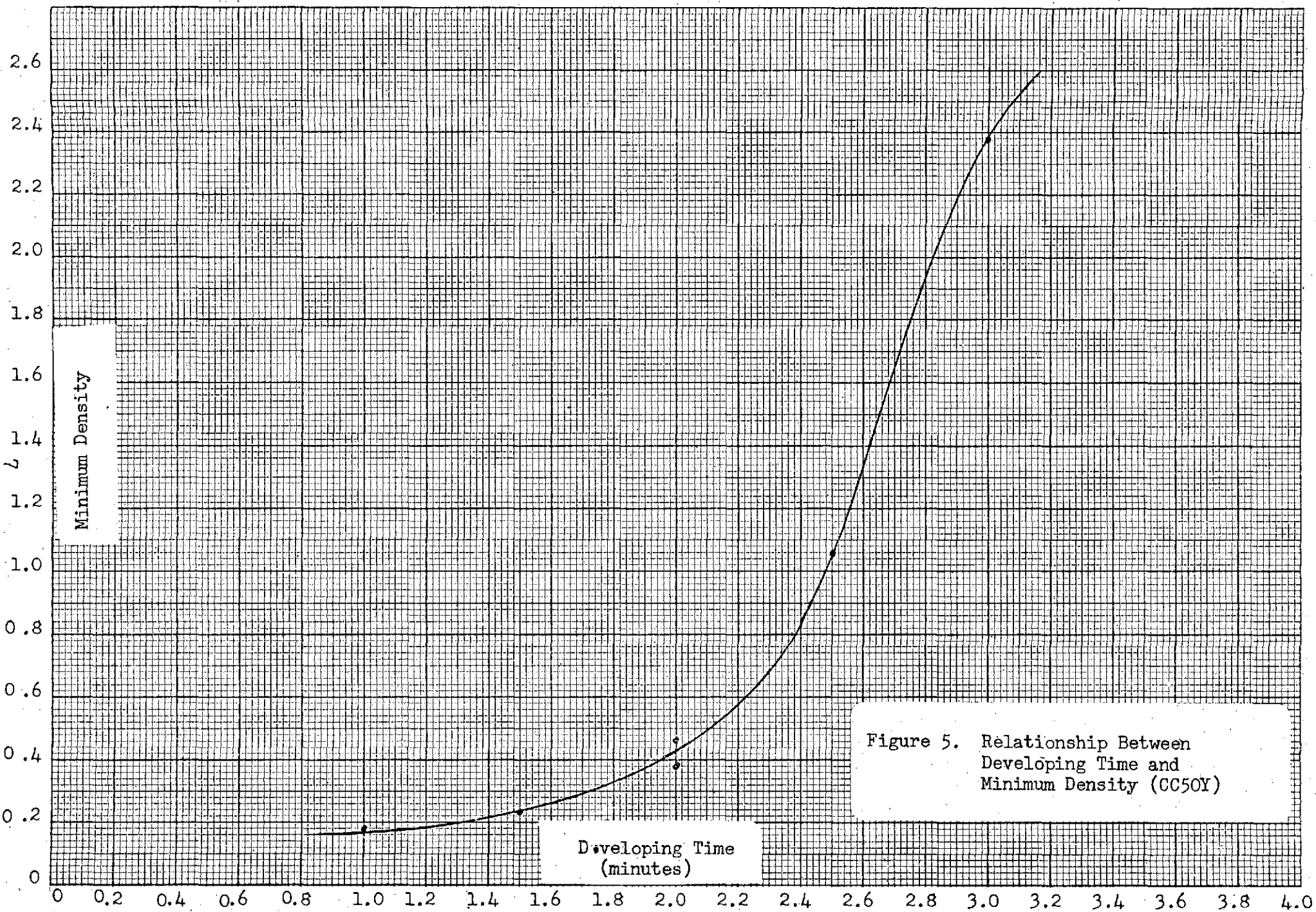


Figure 5. Relationship Between
Developing Time and
Minimum Density (CC50Y)

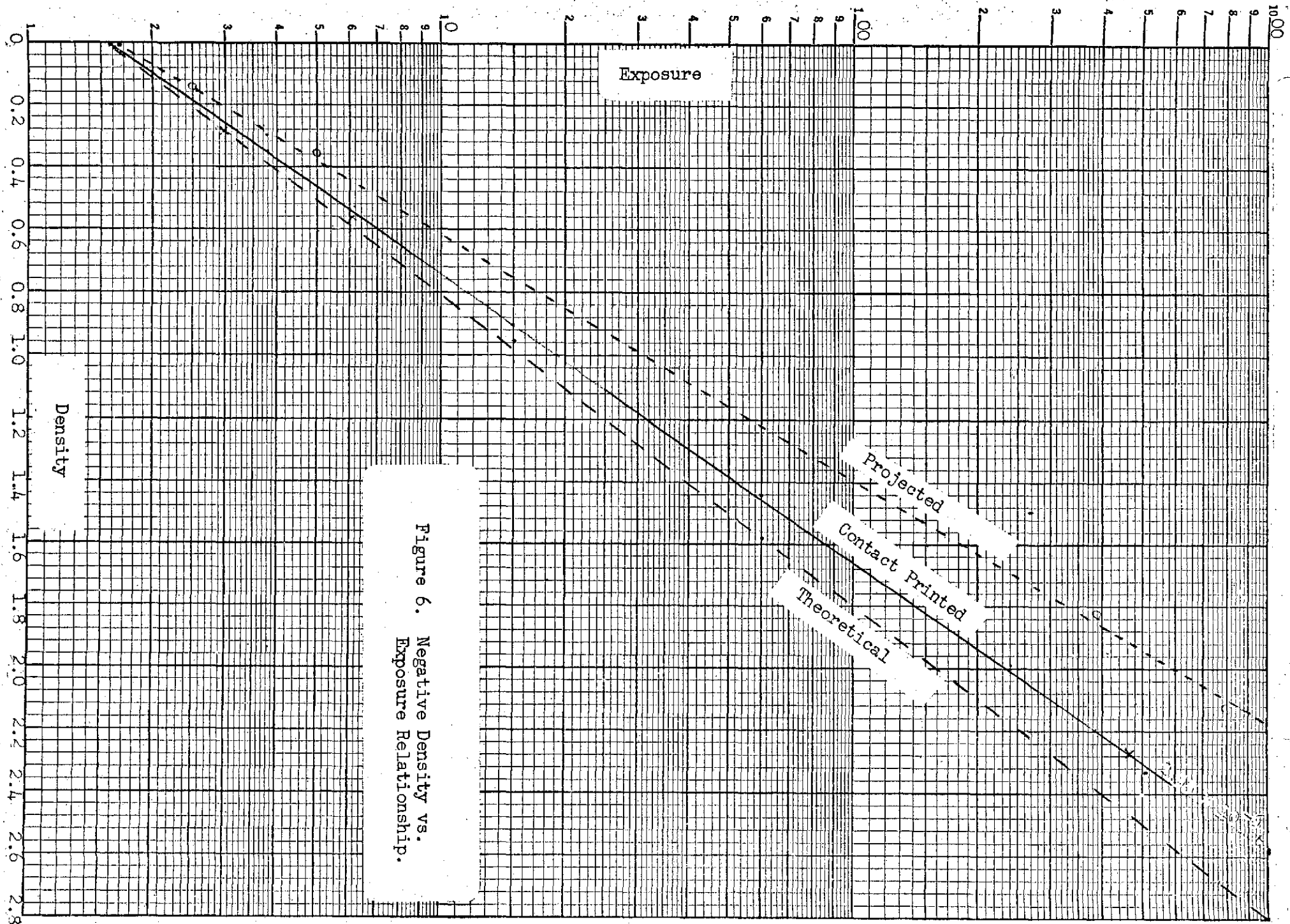


Figure 6. Negative Density vs. Exposure Relationship.

will produce two narrow contours in place of the one broad contour. This double contour may be ambiguous in some cases. Alternately, the contour film image may be duplicated at high contrast using conventional film products.

CONCLUSION

With reasonable reliability, Agfacontour film can be utilized to record a given density region from a transparency or a given density level in an illuminated field.

Because of its specialized nature, this material will not have a wide application in general photography. However, it should be useful for specialized applications which can benefit from its ability to discriminate between density or intensity levels.

Some possible areas of application are:

1. Astronomy - determining intensity distribution of astronomical objects.
2. Geology and Cartography - determining areas of equal albedo for topological studies.
3. Earth Resources - determining areas of blight, crop differentiation, and soil analysis.
4. Optics - studying the field(s) of illumination in optical equipment for uniformity.

Because of its unique properties, it is anticipated that Agfacontour film will be utilized in the analysis of the film carried for the Apollo 16 spectrograph and UV camera.